# Census of the Butterflies of the National Audubon Society's Appleton-Whittell Research Ranch, Elgin, Arizona 

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#### Abstract

The surprisingly rich butterfly fauna of the Audubon Society's Appleton-Whittell Research Ranch is censused and an annotated checklist presented. One hundred and three species are included.


## Introduction

The purpose of this study was to inventory and census the butterfly fauna of the Audubon Society's Appleton-Whittell Research Ranch. The Ranch lies approximately 15 km southeast of Elgin in Santa Cruz County, Arizona. The 3170 ha of the Research Ranch were set aside in 1968 by the Appleton family and later acquired by the National Audubon Society. The Ranch serves as a sanctuary for indigenous plants and animals and as a site for non-destructive ecological research. In the 16 years since its founding a great deal of research has been carried out on plants, vertebrates, and the abiotic environment; but little has focused on the invertebrates.

The Research Ranch is comprised of patented (i.e. private), federal (U.S. Forest Service), and State of Arizona parcels. Most of the land is rolling grassland and oak savannah through which small fingers of riparian and pinyon-juniper woodlands extend. The sections of nearly pure grassland in the northern half of the Ranch produced fewer species, and they yielded only a few specialties (species with restricted ranges) not found elsewhere on the property (e.g. Hesperia uncas lasus). The deeper canyons toward the center of the Ranch-Post Canyon, Turkey Creek, O'Donnell Creek, etc.-possessed the greatest lepidopteran diversity. This diversity was coupled with a modicum of specialties (e.g. Amblyscirtes texanae, Adopaeoides prittwitzi). The extreme southern edge of the Ranch, especially Lyle Canyon and vicinity, had both high diversity and numbers of specialties (e.g. Yvretta carus, Cyllopsis henshawi). Proximity to the Huachuca Mtns. is responsible, at least in part, for this.

## Methods

A total of 48 visits were made to the Ranch covering 224 hours.

Censusing began in August 1982 and ended January 1984. Most areas were explored on foot during the censuses and some were singled out for special attention. These were: Lyle and Post Canyons, Turkey and O'Donnell Creeks, the higher ridges between these drainages, Finley and Telles Tanks, and the Headquarters area.

Records were organized into ten-day periods. At least one visit was made during each ten-day period for the duration of the study, except for the months of December, January, and February when suitable days (clear, calm, temperatures over $15^{\circ} \mathrm{C}$ ) were uncommon. Numbers of individuals during all visits were tallied for four-hour periods to obtain relative abundances. These were categorized as abundant-A ( $>100$ per-hour period), common-C (between 13 and 99 per 4 -hour period), uncommon-U (between 3 and 12 per 4-hour period), rare-R (1 or 2 per 4 -hour period), and single specimen-S ( 1 per 10-day period. An attempt to tie specific habitats to species occurrence was abandoned because most species have different needs at different times and, depending upon nectaring, water utilization, egg laying, mate location, etc., are found at a number of locations during the lifespan of any given brood or even on any given day. However, certain general distribution patterns were noted.

A reference collection is housed at the Research Ranch Headquarters. An attempt was made to secure a pair of each species (either male and female or a dorsal and ventral view), although this was not always possible. At least one specimen of each "resident" species is represented in the collection. A "resident" species is defined as one which is known or strongly suspected to breed on the Ranch ( 92 species, $89.3 \%$ of total). Included in this category was Hylephila phyleus, which probably does not survive winters on the Ranch itself but winters at nearby areas of lower elevation. Nine species ( $8.7 \%$ of total) were designated as "influx" species. These are species of regular occurrence seasonally, but they are unable to survive winters at the Ranch or even in most areas of southeastern Arizona. Eight "influx" species are present in the collection: Polygonus leo, Urbanus dorantes, Kricogonia lyside, Eurema proterpia, E. boisduvaliana, Phoebis agarithe, P. sennae, and Euptoieta hegesia. One species, Anteos clorinde, was seen but could not be netted. The final category, which might be considered a subset of "influx", is the "vagrant". "Vagrant" species do not regularly occur in the area or even in the state but rarely find their way here. They most often appear during and after the chubasco (strong mid and late summer rainy season) season. Two species (1.9\%)-Marpesia petreus and Papilio astyalus-are best classified as "vagrant".

The following annotated checklist mostly follows Miller and Brown (1981), both in sequence and systematics. However, in several cases, for example in generic designations, the older usages of Howe (1975) are preferred.

## Discussion

The rich diversity of Lepidoptera at the Ranch, 103 species, is affected by a number of factors. The weather is of primary import, especially winter temperatures and precipitation, prevailing winds, humidity levels, and, especially, summer rainfall. For some of these variables the data were remarkably constant between the two winters of the study (similar winter rainfall totals and low winter temperatures for the two years: 1981-82 vs. 1982-83). The greatest variation occurred during the critical period of the summer chubascos. The onset of these rains was later in 1982 (mid-July) than in 1983 (late June). The total rainfall for the chubasco period-July, August, and September-in 1982 was 20.3 cm , approximately half that for the 1983 chubasco of 39.4 cm . Under a regime of wet weather in Arizona and northern Sonora, Mexico, the vegetation can be conductive to sizeable influxes of primarily tropical species. These conditions existed during 1983 and likely contributed to the rich Lepidoptera activity during that season.

The author's familiarity with local land contours, drainages, plant associations, nectar sources, watering holes, etc. also increased the day-to-day success in the field, accounting for some of the disparity between the two seasons. For example, on August 18th, 29 species were found in 1982 and 49 in 1983.

The late rainy season in August and September usually produced the greatest concentrations of individuals and the highest numbers of species (Fig. 1) for the year. During this study, the highest species count for a single trip was made on 2 August 1983 when 51 species were recorded. In fact, the four trips made between 27 July and 3 September in that year produced the four highest counts, all yielding 49 or more species per day. A secondary high was recorded in May 1983 following

| Temporal Distribution | Average Number <br> Species <br> Per Visit | Total Number <br> species <br> Mer Month |
| :--- | :---: | :---: |
| Month | 3.00 | 3 |
| January | 1.33 | 4 |
| February | 14.50 | 21 |
| March | 22.33 | 35 |
| April | 34.25 | 55 |
| May | 31.75 | 47 |
| June | 37.50 | 59 |
| July | 37.83 | 67 |
| August | 37.83 | 67 |
| September | 33.42 | 57 |
| October | 26.50 | 41 |
| November | 3.66 | 9 |
| December | - | 103 |

Figure 1.
an unusual extended wet period. Under more normal conditions, the May numbers of individuals and species probably would have been more in line with those of April and June.

Lows for numbers of individuals and species were found in December, January, and February when freezing night temperatures were the rule. The lowest temperature of the study $\left(-10.6^{\circ} \mathrm{C}\right)$ was recorded on 24 December 1982. Insect activity is low during these months and even lower in the canyon bottoms due to cold air drainage. Those species favoring slopes and ridges have a better chance of maintaining adult populations over the winter (e.g. Euptoieta claudia).


A number of other species have been documented from the northern Huachuca Mtns., the Mustang Mtns., Babacomari Cienega, Canelo Cienega, and other locales in the general vicinity of the Research Ranch but failed to turn up during the study. These species include Systasea zampa (W.H. Edwards), Erynnis meridianus Bell, Celotes nessus (W.H. Edwards), Oarisma edwardsii (Barnes), Stinga morrisoni (W.H. Edwards), Atrytonopsis deva (W.H. Edwards), A. python (W.H. Edwards), Amblyscirtes cassus W.H. Edwards, A prenda Evans, Agathymus evansi (H. A. Freeman), Megathymus ursus Poling, Incisalia augustus annetteae dos Passos, Phaeostrymon alcestis oslari (Dyar), Euphilotes rita (Barnes \& McDunnough), Apodemia palmerii (W.H. Edwards), Thessalia fulvia (W.H. Edwards), Polygonia satyrus (W.H. Edwards), Anaea aidea (Guerin-Meneville), and Gyrocheilus patrobas tritonia (W.H. Edwards). Any records of these or other especies from the Research Ranch property should be reported to the author.

Acknowledgements. The author would like to thank the following for guidance, encouragement, plant determinations, suggestions, map-making, general tidbits, etc.: Jane and Carl Bock, Vern and Nancy Hawthorne, Joe and Helen Taylor, Jack Kaiser, Doug Danforth, Arnold Moorhouse, Char Ernstein, Renee Vitali, and the Audubon Society.

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South end of Ranch only Active in the mornings Double-brooded
Also comes to water Lyle Cyn, 27 July 1983
Also hilltops
Males are pat
Mostly near Headquarters
Lyle Cyn, 19 Aug 1983
Males territorial
Grass feeder, Paspalum. sp.
Present at the Ranch only
in 1982
Lyle Cyn vicinity only
Present at Ranch only in 1982
Strong hilltopper
Lyle Cyn, 2 Aug 1983
Lyle Cyn vicinity only
REMARKS

| ATUS | MONTHS COLLECTED |  |  |  |  |  |  |  | habitat | REMARKS |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $p$ |  |  | M | $J$ J |  |  |  |  |  |  |
|  |  |  |  |  | R | U |  |  | Oak Canyons | 9 Oct 1982, latest capture in the state |
| 1 |  |  |  |  | S | R |  |  |  | Strong nectarer |
| P | S | S |  |  |  |  |  |  | Oakhilltops | Lyle Cyn vicinity only |
| 1 |  |  |  | S |  | S | R | S |  | Expected more commonly someyears |
| P |  |  | $R \mathrm{R}$ | R | R | S |  |  | Wooded canyons |  |
| P |  |  | U | C C | C |  |  |  | Wooded cyns |  |
| P |  |  |  | R | R |  |  |  | Wooded cyns | South end of Ranch only |
| P |  |  | U U | U U | C | U |  |  | Rocky cyns | Active in the mornings |
| P |  | R | R | R | R |  |  |  | Limestone cyns | Double-brooded |
| P |  |  | $\cup R$ | $R \mathrm{R}$ | U | R |  |  | Shaded thickets |  |
| P | R | U |  |  |  |  |  |  | Oak hilltops | Also comes to water |
| P |  |  |  | S |  |  |  |  | Oakcyns | Lyle Cyn, 27 July 1983 |
| P | U | R |  | R | R | R | S |  | Oakcyns | Also hilltops |
| P |  | R | R | R | R | R | R | $U$ | Widespread | Males are patrollers |
| P |  |  |  | C U | U | U | A | A | Widespread |  |
| P |  |  | $\cup \mathrm{R}$ | R R | R | R | C | R | Dry arroyos |  |
| P |  |  |  | R | R | S |  |  | Open areas | Mostly near Headquarters |
| P |  |  |  |  | S |  |  |  | Oak canyons | Lyle Cyn, 19 Aug 1983 |
| P |  | R | $R \mathrm{R}$ | $R \mathrm{R}$ | R | U | U | R | Dry arroyos | Malesterritorial |
| P |  |  |  | R | S |  |  |  | Perm. water | Grass feeder, Paspalum. sp. |
| P |  |  |  |  |  | S | R |  | Gardens and flowers | Present at the Ranch only in 1982 |
| P |  | S | R | R | R |  |  |  | Grass benches | Lyle Cyn vicinity only |
| P |  |  |  |  | R |  |  |  | Open grassland | Present at Ranch only in 1982 |
| P |  | R | R R |  | R | R | R | R | Oakgrassland | Strong hilltopper |
| P |  |  |  |  | S |  |  |  | Oakgrassland | Lyle Cyn, 2 Aug 1983 |
| P |  |  | S |  |  |  | R |  | Grass benches | Lyle Cyn vicinity only |



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PAPILIONIDAE
Battus philenor
Papilio polyxenes asterius
P．cresphontes
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P．multicaudata

[^0]Libytheana




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